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Akzenta Paneele + Profile GmbH

56759 Kaisersesch

Panel comprising a locking system

A panel comprising a quadrangular panel portion of coated wood material, wherein mutually opposite edges of the panel have mutually complementary positively locking profiles so that similar panels can be assembled, and wherein the surface of at least one of the positively locking profiles has at least in region-wise manner raised portions and recesses.

An arrangement of the general kind set forth is known from DE 299 14 604 U1. It discloses a panel with complementary positively locking profiles. The positively locking profiles can be considered as an inner portion and an outer portion. The outer portion is in the form of a tongue and the inner portion is in the form of a groove. Both tongue and also groove have raised portions and recesses.

Tolerances are required for production of the complementary positively locking profiles of the known panel. The result of such tolerances can be that either a clearance or an overdimension occurs when connecting any tongue (outer portion) to any groove (inner portion). Because tolerance must always be provided in the industrial manufacture of mass-produced articles such as panels, it is not possible to guarantee a uniform quality for locking two panels together. Joints between adjacent panels are therefore either closed or have gaps into which dirt can penetrate.

Panels of the general kind set forth are used for example for the production of floor coverings, so-called laminate panels. Equally panels of that kind can be designed in the form of wall or ceiling panels. Predominantly the panels comprise medium-density fibreboard (MDF) or high-density fibreboard (HDF), on to which further layers, mostly resin-

impregnated cellulose layers, are laminated. Frequently the positively locking profiles are provided integrally on the panels, for example by being milled thereon. In general terms the panels are of a rectangular configuration with two long edges which are in mutually opposite relationship and two short edges which are in mutually opposite relationship.

The thickness of the laminate panels is generally less than the thickness of parquet panels. Usual thicknesses are in a range of between 5 and 8 mm. Thinner or thicker laminate panels are rare. It will be noted however that parquet panels have in the meantime also been provided with positively locking profiles. Therefore the positively locking profiles of the proposed new panel can also be provided on parquet panels.

The complementary positively locking profiles of the one panel are restricted by the thickness of the panel and are fairly small. They therefore have to be produced very accurately in terms of shape and fit so that they fit one into the other. A high degree of fitting accuracy in respect of the complementary positively locking profiles

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is an important requirement in order to ensure in particular a closed joint on a top side of the interlocked panels because the surface is visible to the user of a finished floor covering. Particularly for floors it is desirable to have a smooth surface in which the joints between the panels do not form any gaps but the edges are in closely mutually butting relationship and are in contact with each other.

In the case of almost all panels with positively locking profiles, one of the complementary positively locking profiles can be viewed as an inner portion and the associated profile can be viewed as an outer portion. The relationship of an outer portion to an associated inner portion prior to the portions being joined together is referred to as the fit. Both the outer portion and also the inner portion involve given nominal dimensions,

wherein tolerances are allowed for each nominal dimension. Each positively locking profile whose actual dimension is within the tolerance can be used. In accordance with a system fits are divided into three different kinds: a clearance fit, an interference fit and a transition fit. The subdivision is always based on the dimensional relationship of the outer portion with its tolerance to the inner portion with its tolerance prior to joining of the two portions.

In the case of a clearance fit the tolerances even in the worst case scenario are such that at any event after joining there is a clearance between the outer portion and the inner portion.

In the case of an interference fit the tolerances are such that at any event after the joining operation there is an overdimension between the outer portion and the inner portion and there must therefore be elastic deformation of the portions being joined.

The situation is referred to a transition fit if the tolerance ranges which are allowed for the outer portion and the inner portion partially overlap. Without knowledge of the precise actual dimensions of the outer portion and the inner portion the combination of an outer portion which is within its tolerance with an inner portion which is also within its tolerance, in the assembled condition, can give either a clearance or an overdimension or in the ideal case an exact fit which has neither clearance nor overdimension.

In order in the case of panels always to have a closed joint on the top side of the panels which is visible in the laid condition, it is known from WO 97/47834 to provide on a positively locking profile elastic deformation which produces prestressing of the panels. By means of that prestressing, the panels are forced towards each other and in that way the joint is held in a closed condition at the top side of the panels. The panel known from WO 97/47834 involves a modified tongue-and-groove panel, wherein the tongue and the groove are each of an undercut configuration. The geometry of the positively locking profiles gives rise to elastic deformation at one of the groove walls, namely the lower groove wall which in the laid condition is towards the surface on which the panel is laid. The deformed

lower groove wall flexes like a beam which is gripped at one end. In the assembled condition of two panels flexing of the groove wall is at least partially retained. The closed nature of the joint is achieved by spring resiliency of the lower groove wall and by virtue of a particular geometry of the groove wall and the tongue, which involves the action of inclined surfaces which bear against each other.

There is the disadvantage in accordance with the teaching of WO 97/47834 that the internal cohesion of the wood material is weakened by the permanent flexing effect. The higher the degree of deformation, the correspondingly 'softer' becomes the wood material in the flexurally deformed region. A further disadvantage is that, in the event of a loading applied over a long period of time, relaxation of the wood material occurs in the flexurally deformed region. Absorption of moisture on the part of the wood material promotes the relaxation effect, just like an action by heat. Admittedly, positively locking profiles of panels are usually impregnated with agents which

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are intended to prevent the absorption of moisture, but depending on the respective quality of the impregnation and the nature and location of use of the panel a gradual absorption of moisture cannot be prevented.

The object of the invention is to propose a panel whose positively locking profiles are of such a configuration that panels have closed joints in the assembled condition without at the same time producing elastic deformation of a positively locking profile, such as to put a strain on wood material.

According to the invention that object is attained in that the raised portions are provided with an overdimension, the overdimension can be ground away by friction during assembly of two panels, and that the recesses are of a volume in which resulting abrasion particles from the raised portions can be received.

In the joining operation the raised portions are ground away to the required dimension. A closed joint is formed at the top side of the panel. In

addition, a uniform heightwise level without heightwise displacement at the joint is achieved.

Due to the action of heat, the positively locking profiles can be increased in size or they can swell up due to the action of moisture. Due to use in the specified manner, namely on a soft, footstep noise-attenuating support, in those cases grinding of the raised portions continues. That provides for renewed adaptation of the fitting shape of the positively locking profiles and accordingly affords a suitable fit without overdimension and without clearance.

Desirably, one of the positively locking profiles is in the form of a groove profile with an undercut configuration and the oppositely disposed positively locking profile is in the form of a tongue profile with an undercut configuration. The undercut configurations of the tongue profile and the groove profile can be fitted one into the other by virtue of inclined positioning of the panels. Subsequent

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CLAIMS

1. A panel (1, 2) comprising a quadrangular panel portion of coated wood material, wherein mutually opposite edges of the panel (1, 2) have mutually complementary positively locking profiles (3, 4) so that similar panels (1, 2) can be assembled, and wherein the surface of at least one of the positively locking profiles (3, 4) has at least in region-wise manner raised portions (5, 6, 7) and recesses (8, 9), characterised in that the raised portions (5, 6, 7) are provided with an overdimension, that the overdimension can be ground away by friction during assembly of two panels (1, 2), and that the recesses (8, 9) are of a volume in which resulting abrasion particles (5a, 6a, 7a) from the raised portions (5, 6, 7) can be received.